

8.701

Introduction to Nuclear
and Particle Physics

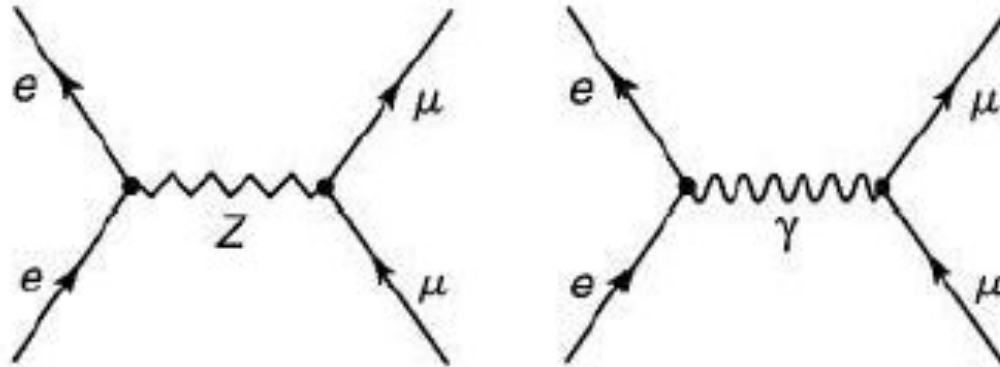
Markus Klute - MIT

6. Weak Interaction

6.5 Neutral Current



Weak and electromagnetic contributions



Studies in detail at the SLC at SLAC and LEP at CERN

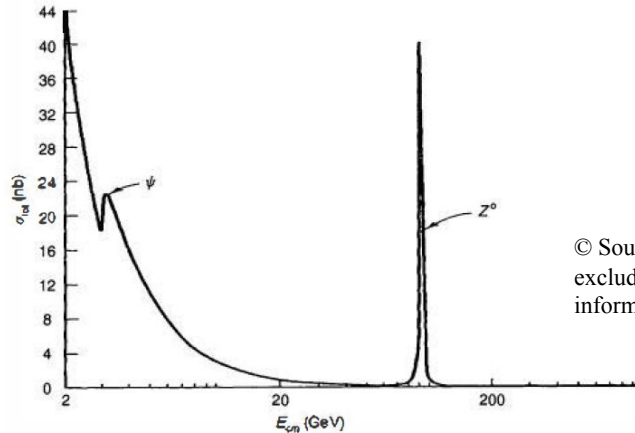
Relative contributions

(see Griffiths chapter 9.6 for details)

$$\sigma = \frac{(\hbar c g_Z^2 E)^2}{48\pi} \frac{[(c_V^f)^2 + (c_A^f)^2][(c_V^e)^2 + (c_A^e)^2]}{[(2E)^2 - (M_Z c^2)^2]^2 + (\hbar M_Z c^2 \Gamma_Z)^2}$$

$$\sigma = \frac{(\hbar c g_e^2)^2 (Q^f)^2}{48\pi E^2}$$

$$\frac{\sigma_Z}{\sigma_\gamma} \approx \frac{1}{8} \left(\frac{M_Z c^2}{\hbar \Gamma_Z} \right) \approx 200$$



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